



E3 Effluent Disposal to Ground Water

This chapter describes the regulations, standards, policies, and guidance related to discharge of treated municipal wastewater to ground water. References are made to the “Implementation Guidance for the Ground Water Quality Standards” (guidance document) which was developed to explain and interpret the means to implement the state Water Quality Standards for Ground Water.

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E3-1 Regulatory Framework

The two following state regulations and Ecology's publication, "Implementation Guidance for the Ground Water Quality Standards," are the primary sources of information related to discharge of municipal wastewater effluent to ground waters. Additional information on applicable laws and regulations relating to approval and permitting requirements is contained in [Chapter G1](#).

E3-1.1 Chapter 173-216 WAC, State Waste Discharge Permit Program

This regulation outlines the process for obtaining a permit for wastewater effluent discharges to ground water. A permit is required for discharges from industrial and commercial facilities, as well as from municipal facilities. Water reclamation projects that discharge to ground water for the purpose of recharge are described in [Chapter E1](#).

E3-1.2 Chapter 173-200 WAC, Water Quality Standards for Ground Waters of the State of Washington

This regulation establishes the numerical criteria and other requirements for the protection of ground waters in the state. The regulation is intended to be preventive in nature. The goal is to maintain a high quality of ground water and to protect existing and future beneficial uses of the water. This is achieved through three mechanisms, as follows:

- (1) **AKART.** AKART is the requirement for "all known, available and reasonable methods of prevention, control and treatment." That means a wastewater must be provided with the best known methods of prevention, control, and treatment that are reasonably practical. All wastes must be provided with AKART prior to entry into the state's waters, regardless of the quality of the receiving water.
- (2) **Antidegradation policy.** This policy mandates the protection of background water quality and prevents the degradation of ground water quality that would harm a beneficial use or violate the Ground Water Quality Standards.
- (3) **Human health and welfare based standards.** These include numeric and narrative standards.

The standards protect all ground water in the saturated zone, statewide. Water in the vadose zone (unsaturated zone) is not specifically protected by the standards. It is not necessary for ground water to be defined as an aquifer (ground water that produces a significant yield) in order to be protected. The standards cover ground water that is perched, seasonal, or artificial.

Since ground water in the state has not been fully characterized, particularly interconnections between aquifers, the regulation protects all ground water equally. All ground water is classified as a potential source of drinking water for the purposes of the standards.

E3-1.3 Implementation Guidance for the Ground Water Quality Standards

This guidance document develops the framework for implementation of Chapter 173-200 WAC and provides clarification of the intent of certain policies set forth in the regulation. The document outlines specific requirements necessary for a waste discharge to achieve compliance with the standards. Ecology uses the guidance document as the primary mechanism to apply the standards to ground water discharges regulated by the agency and to evaluate the issuance of State Waste Discharge Permits. Requirements for specific

projects will depend upon the nature of the discharge and the characteristics of the discharge site.

“Implementation Guidance for the Ground Water Quality Standards” discusses:

- Activities regulated by Chapter 173-200 WAC.
- The antidegradation policy.
- Mechanisms for protecting ground water quality.
- Requirements for the hydrogeologic study and the monitoring plan.
- Implementation of the antidegradation policy through the establishment of enforcement limits and early warning values.
- Response to violations of the standards.
- Process and implications for designating a special protection area.

E3-2 Regulated Ground Water Discharge Activities

The Ground Water Quality Standards apply to any activity that has potential to impact ground water quality, including both point source and nonpoint source activities. See the guidance document for activities for which these standards apply.

Wastewater management activities that are considered discharges to ground water include:

- Land treatment of wastewater.
- Drainfield disposal.
- Water reuse through ground water recharge.
- Impoundments.

An engineering report based on Chapter 173-240 WAC is required in support of a State Waste Discharge Permit application for a new system or the modification of an existing system discharging to ground water. See [Chapter G1](#) for engineering report requirements.

E3-2.1 Land Treatment of Wastewater

Land treatment systems apply wastewater either below the land surface or by surface spreading to provide effluent treatment prior to its contact with the saturated ground water zone. The wastewater generally receives some level of preliminary treatment prior to application to the soil. The systems then utilize surface soils, cover crops, and/or soils in the vadose zone to provide additional treatment. See [Chapter G3](#) for discussions of wastewater treatment technologies, including land treatment, which are particularly applicable to small communities.

Land treatment is different from land application of reclaimed water described below in [E3-2.3](#) and in [Chapter E1](#).

“Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems” are used to identify critical elements in the design of land treatment systems for soil treatment and protection of ground water quality. The guidelines were prepared to implement engineering report requirements of Chapter 173-240 WAC. Although the guidelines were prepared for treatment of industrial wastewater, the

fundamental design concepts are applicable to land application of municipal wastewater treatment as well. This guidance document should be used with DOH's "Design Criteria for Municipal Wastewater Land Treatment Systems for Public Health Protection," for preparing the engineering report prepared in support of the State Waste Discharge Permit application for new facilities or the modification of existing facilities. Land treatment systems are required to follow these guidelines or may use the "Water Reclamation and Reuse Standards."

E3-2.2 Drainfield Disposal

Ecology's "Permit Writer's Manual" contains a model for assessing the impacts of on-site sewage systems on ground water quality. This model should be applied to projects proposing drainfield disposal as a wastewater management technique. The following criteria must be achieved to utilize a drainfield as the disposal option.

- Proposals for large community on-site sewage systems (greater than 14,500 gpd) must demonstrate that it is not possible to connect to an existing sewage treatment facility.
- Proposals must also demonstrate consistency with the Growth Management Act, local service area requirements, and compliance with SEPA.
- Impacts to ground water quality should be assessed using the methodology outlined in Ecology's "Permit Writer's Manual." If the assessment indicates that an increase of 2 mg/l nitrate nitrogen above background water quality is likely to occur, or if the ground water quality criteria will be exceeded, then treatment and disposal options must be evaluated using the methodology described in the "Permit Writer's Manual." This model will be used to derive effluent limitations and density requirements.

E3-2.3 Water Reuse Through Ground Water Recharge

Ground water recharge with reclaimed water can be managed in two ways: by land application, either on the land surface or just below the surface, and by direct injection of the reclaimed water into the subsurface or aquifer. Systems designed for the recharge of water are not dependent on soil treatment in order to meet ground water standards, therefore the water is highly treated prior to application or injection. These systems are required to meet the Water Reclamation and Reuse Standards and must also receive a State Waste Discharge Permit. The requirements for water reclamation and reuse are addressed in [Chapter E1](#).

E3-2.4 Impoundments

Requirements for municipal wastewater discharge to impoundments are discussed in the "Implementation Guidance for the Ground Water Quality Standards."

E3-3 Antidegradation Policy

The antidegradation policy, along with AKART, forms the primary mechanism for protecting ground water quality. The policy is intended to preserve existing and future beneficial uses by minimizing pollutant increases over background water quality. Antidegradation is differentiated from "nondegradation," which prohibits any increase in contaminant concentrations in ground

water. Antidegradation allows some increase in pollutant levels but not to the extent that beneficial uses are impacted. The intent is not to allow degradation of ground water up to or beyond the ground water criteria, but rather to protect background water quality to the extent practical.

Overriding public interest is applied when existing high-quality ground water cannot be maintained. Existing high-quality ground water is defined as background water quality that does not exceed the criterion.

The antidegradation policy, nondegradation, and overriding public interest are described in the Ground Water Quality Standards and the guidance document.

E3-4 Ground Water Quality Standards Checklist

“Implementation Guidance for the Ground Water Quality Standards” contains a checklist of elements that should be considered in order to implement the Ground Water Quality Standards through a State Waste Discharge Permit. The hydrogeologic study and the monitoring plan are tools used to assess the current and future conditions of the ground water environment. A ground water discharge that is determined to represent a “potential to contaminate” requires a hydrogeological study, unless the discharge is covered by a general permit, a policy, guideline, regulation, or best management practice (BMP) that has Ecology-approved ground water protection provisions. Potential to contaminate is determined to be present if both of the following conditions exist:

- (1) There is a discharge of a regulated substance to the subsurface or the land surface, and
- (2) The discharge rates are either greater than agronomic rates or the wastewater is stored in an impoundment (whether lined or unlined).

If a discharge is covered by a general permit or by ground water protection provisions, but is considered to have potential to contaminate, Ecology is not prohibited from requesting a ground water evaluation or additional hydrogeologic characterization. If the discharge is considered to have limited potential to contaminate, the hydrogeologic study can be waived.

The level of effort required to complete each element is dependent upon the nature of the discharge and discharge site characteristics. Factors that influence the level of effort include the wastewater quantity and quality and site characteristics such as depth to ground water, geology, treatment capacity of the soils, etc. For example, a discharge that has a limited potential to contaminate is not required to undergo the hydrogeologic study but must undergo a monitoring plan. However, the plan may propose only effluent monitoring, and then monitoring of ground water as a contingency if a problem is observed. The monitoring plan should address where the effluent will be sampled, constituents to be monitored, frequency, and how the data will be analyzed.

E3-5 References

Washington State Department of Ecology. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems. Water Quality Program, Publication No. 93-36. 1993.

Washington State Department of Ecology. Implementation Guidance for the Ground Water Quality Standards. Publication No. 96-02. 1996.

Washington State Department of Ecology. Permit Writer's Manual. Publication No. 92-109. 1998 update.

Washington State Department of Health. Design Criteria for Municipal Wastewater Land Treatment Systems for Public Health Protection. 1994.

Washington State Departments of Ecology and Health. Water Reclamation and Reuse Standards. Publication No. 97-23. September 1997 or latest edition.